

LXXI.

MEMOIRS

OF

LITERATURE.

MONDAY, July 23. 1711:

OBSERVATIONS upon Ants, in
a Letter to a Friend.

SIR,

YOU have been pleased to write to me, that you desire to know more particularly what Observations I have made upon some of the Smallest Insects that are in Nature. I wish I could fully satisfy your Curiosity, by giving you an exact, and, as it were, an Anatomical Description of those little Animals. I should be glad to inform you how Ants are generated, to treat of their different Species, to shew you in what Order they are placed in their Nests, and to mention many other Curious Particulars, which perhaps I shall be able to communicate to you hereafter. I had neither a sufficient Time, nor proper Microscopes, to take an exact View of all those Things, and therefore I hope you will be contented with such Observations as I can now impart to you.

I made those Observations in the Country, where I spent all the Summer without Company, in a Place which appear'd to me very melancholy. One would think, that God was pleased to raise Ants, to bring me off from Idleness, and make me hear the Voice of the Wiseman, who says, *Vade ad formicam, O piger*. And indeed those Insects are not unworthy of our Attention, since the Scripture commends them; and such a Curiosity may contribute to our Improvement. A particular View of the smallest Works of Nature, affords new Reasons to admire the Wisdom of God; and, generally speaking, the Conduct of those small Insects appears more orderly, and even more edifying, than that of Men.

In a Room next to mine, which had been empty for a long time, there was upon a Window a Box full of Earth, two Foot deep, and fit to keep Flowers in. That Kind of Parterre had been long uncultivated; and therefore it was cover'd with old Plaster, and a great deal of Rubbish that fell from the Top of the House, and from the Walls, which, together with the Earth formerly imbibed with Water, made a kind of a dry and barren Soil. That Place lying to the South, and out of the Reach of the Wind and Rain, besides the Neighbourhood of a Granary, was a most delightful Spot of Ground

for Ants; and therefore they had made three Nests there, without doubt for the same Reason that Men build Cities in fruitful and convenient Places, near Springs and Rivers.

Having a mind to cultivate some Flowers, I took a View of that Place, and removed a Tulip out of the Garden into that Box; but casting my Eyes upon the Ants, continually taken up with a thousand Cares, very inconsiderable with respect to us, but of the greatest Importance for them, they appear'd to me more worthy of my Curiosity than all the Flowers in the World. I quickly remov'd the Tulip, to be the Admirer and Restorer of that little Commonwealth. This was the only thing they wanted; for their Policy, and the Order observed among them, are more perfect than those of the Wisest Republicks: And therefore they have nothing to fear, unless a new Legislator should attempt to change the Form of their Government.

I made it my Business to procure them all Sorts of Conveniences. I took out of the Box every thing that might be troublesome to them; and frequently visited my Ants, and studied all their Actions. Being us'd to go to Bed very late, I went to see them work in a Moon-shiny-Night; and I did frequently get up in the Night, to take a View of their Labours. I always found some going up and down, and very busy: One would think that they never sleep. Every body knows that Ants come out of their Holes in the day-time, and expose to the Sun the Corn, which they keep under Ground in the Night: Those who have seen Ant-hillocks, have easily perceived those small Heaps of Corn about their Nests. What surprized me at first was, That my Ants never brought out their Corn, but in the Night, when the Moon did shine, and kept it under Ground in the day-time; which was contrary to what I had seen, and saw still practised by those Insects in other places. I quickly found out the Reason of it: There was a Pigeon-House not far from thence: Pigeons and Birds would have eaten their Corn, if they had brought it out in the day-time: 'Tis highly probable they knew it by Experience; and I frequently found Pigeons and Birds in that place, when I went to it in a Morning. I quickly deliver'd them from those Robbers; I frighted the Birds away with some Pieces of Paper tied to the End of a String over the Window. As for the Pigeons, I drove them away several times; and when they perceiv'd that that Place was more frequented than before, they never came to it again. What is most admirable, and what I could hardly believe, if I did not know it by Experience, is, That those Ants knew some days after that they had nothing to fear, and began to lay out their Corn in the Sun. However, I perceiv'd they were not fully convinc'd of being out of all danger; for

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they

they durst not bring out their Wealth all at once, but by degrees, first in a small Quantity, and without any great Order, that they might quickly carry it away in case of any Misfortune, watching, and looking every way. At last, being persuaded that they had nothing to fear, they brought out all their Corn, almost every day, and in good Order, and carried it in at night.

There is a strait Hole in every Ants-Nest, about half an Inch deep; and then it goes down sloping into a place where they have their Magazine, which I take to be a different place from that where they rest and eat. For 'tis highly improbable that an Ant, which is a very neat Insect, and throws out of her Nest all the small Remains of the Corn on which she feeds, as I have observed a thousand times, would fill up her Magazine, and spoil her Corn with Nastiness.

The Corn, that is laid up by Ants, would shoot under Ground, if those Insects did not take care to prevent it. They cut off all the Buds before they lay it up; and therefore the Corn that has lain in their Nests, will produce nothing. Any one may easily make this Experiment, and even plainly see that there is no Bud in their Corn. But tho' the Bud be cut off, there remains another Inconvenience. That Corn must needs swell and rot under Ground; and therefore it could be of no use for the Nourishment of Ants. Those Insects prevent that Inconvenience by their Labour and Industry, and contrive the Matter so, that Corn will keep as dry in their Nests as in our Granaries.

They gather many small Particles of dry Earth, which they bring every day out of their Holes, and place them round to heat them in the Sun. Every Ant brings a small Particle of that Earth with her Pincers, lays it by the Hole, and then goes and fetches another. Thus, in less than a Quarter of an Hour, one may see a vast Number of such small Particles of dry Earth heap'd up round the Hole. They lay their Corn under Ground upon that Earth, and cover it with the same. They perform'd this Work almost every day, during the Heat of the Sun; and tho' the Sun went from the Window about Three or Four a Clock in the Afternoon, they did not remove their Corn and their Particles of Earth, because the Ground was very hot, till the Heat was over.

If any one should think that those Animals should use Sand, or small Particles of Brick or Stone, rather than take so much pains about dry Earth; I answer, that upon such an Occasion nothing can be more proper than Earth heated in the Sun. Corn does not keep upon Sand: Besides, a Grain of Corn that is cut, being deprived of its Bud, would be fill'd with small sandy Particles, that could not easily come out. To which I add, that Sand consists of such small Particles, that an Ant could not take them up one after another; and therefore those Insects are seldom to be seen near Rivers, or in a very Sandy Ground.

As for the small Particles of Brick or Stone, the least Moistness would join them together, and turn them into a kind of Mastick, which those Insects could not divide. Those Particles sticking together, could not come out of an Ants-Nest, and would spoil its Symmetry.

When Ants have brought out those Particles of Earth, they bring out their Corn after the same manner, and place it round that Earth: Thus one may see Two Heaps surrounding their Hole, one of dry Earth, and the other of Corn; and then they fetch out a Remainder of dry Earth, on which doubtless their Corn was laid up.

Those Insects never go about this Work but when the Weather is clear, and the Sun very hot. I observ'd, that those little Animals having one day brought out their Corn at Eleven a Clock in the Forenoon, removed it, against their usual Custom, before One in the Afternoon: The Sun being very hot, and the Sky very clear, I could perceive no Reason for it. But half an Hour after, the Sky began to be overcast, and there fell a small Rain, which the Ants foresaw; whereas the *Milan-Almanack* had foretold that there would be no Rain upon that Day.

I have said before, that those Ants which I did so particularly consider, fetch'd their Corn out of a Garret. I went very frequently into that Garret: There was some old Corn in it; and because every Grain was not alike, I observ'd that they chose the best.

I know by several Experiments, that those little Animals take great Care to provide themselves with Wheat, when they can find it, and always pick out the best; but they can make shift without it. When they can get no Wheat, they take Rye, Oats, Millet, and even Crums of Bread, but seldom any Barley, unless it be in a time of great Scarcity, and when nothing else can be had.

Being willing to be more particularly informed of their Forecast and Industry, I put a small Heap of Wheat in a Corner of the Room, where they kept: And to prevent their fetching Corn out of the Garret, I shut up the Window, and stop't all the Holes. Tho' Ants are very knowing, I don't take them to be Conjurors; and therefore they could not guess that I had put some Corn in that Room. I perceived for several Days that they were very much perplexed, and went a great way to fetch their Provisions. I was not willing for some time to make them more easy; for I had a Mind to know whether they would at last find out the Treasure, and see it at a great Distance, and whether Smelling enabled them to know what is good for their Nourishment. Thus they were some time in great Trouble, and took a great deal of Pains: They went up and down a great way looking out for some Grains of Corn: They were sometimes disappointed, and sometimes they did not like their Corn after many long and painful Rambles. What appeared to me wonderful, was, That none of them came Home without bringing something: one brought a Grain of Wheat, another a Grain of Rye or Oats, or a Particle of dry Earth, if she could get nothing else.

The Window, upon which those Ants had made their Settlement, look'd into a Garden, and was Two Stories high. Some went to the further end of the Garden, others to the Fifth Story, in quest of some Corn. It was a very hard Journey for them, especially when they came Home loaded with a pretty large Grain of Corn, which must needs be a heavy Burthen for an Ant, and as much as she can bear. The bringing of that Grain from the middle of the Garden to the Nest, took up Four Hours; whereby one may judge of the Strength and prodigious Labour of those little Animals. It appears from thence, that an Ant works as hard as a Man, who should carry a very heavy Load on his Shoulders almost every Day for the Space of Four Leagues. 'Tis true those Insects don't take so much Pains upon a flat Ground: But then how great is the Hardship of a poor Ant, when she carries a Grain of Corn to the Second Story, climbing up a Wall, with her Head downwards, and her Backside upwards? None can have a true Notion of it, unless they see those little Animals at work in such a Situation: The frequent Stops they make in the most convenient Places, are a plain Indication of their Weariness. Some of them were strangely perplexed, and could not get to their Journey's end. In such a Case, the strongest Ants, or those that are not so weary, having carried their Corn to their Nest, come down again to help them. Some are so unfortunate as to fall down with their Load, when they are almost come Home: When this happens, they seldom lose their Corn, and carry it up again.

I saw one of the smallest carrying a large Grain of Wheat with incredible Pains: When she came to the Box, where the Nest was, she made so much haste that she fell down with her Load, after a very laborious Ramble: Such an unlucky Accident would have vexed a Philosopher. I went down, and found her with the same Corn in her Paws: She was ready to climb up again. The same Misfortune happen'd to her Three Times: Sometimes she fell in the Middle of her Way, and sometimes higher; but she never let go her hold, and was not discouraged. At last, her Strength failed her: She stop't; and another Ant help'd her to carry her Load, which was one of the largest and finest Grains of Wheat that an Ant can carry. It happens sometimes, that a Corn slips out of their Paws, when they are climbing up: They take hold of it again, when they can find it; otherwise they look for another, or take something else, being ashamed to return to their Nest without bringing something: This I have experimented, by taking away the Grain, which they look'd for. All those Experiments may easily be made by any one that has Patience enough; They do not require so great a Patience as that of Ants; but few People are capable of it.

Thus

Thus my Ants were forced to make shift for a Livelihood, when I had shut up the Garret, out of which they fetch'd their Provisions. At last, being sensible that it would be a long time before they could discover the small Heap of Corn, which I had laid up for them, I resolved to shew it to them.

In order to know how far their Industry could reach, I contrived an Expedient, which had a good Success: The thing will appear incredible to those, who never considered, that all Animals of the same Kind, which form a Society, are more knowing than others. I took one of the largest Ants, and threw her upon that small Heap of Wheat. She was so glad to find her self at Liberty, that she ran away to her Nest, without taking any Corn; but she observed it: For an Hour after all my Ants had Notice given them of such a Provision; and I saw most of them very busy in carrying away the Corn I had laid up in the Room: I leave it to you to judge, whether it may not be said, that they have a particular Way of communicating their Knowledge to one another; for otherwise how could they know, one or two Hours after, that there was some Corn in that place? It was quickly exhausted; and I put in more, but in a small Quantity, to know the true Extent of their Appetite or prodigious Avarice; for I make no doubt but they lay up Provisions against the Winter: We read it in the Holy Scripture; a Thousand Experiments teach us the same; and I don't believe that any Experiment has been made that shews the contrary.

I have said before, that there were Three Ants-Nests in that Box or *Parterre*, which formed, if I may say so, Three different Cities, governed by the same Laws, and observing the same Order, and the same Customs. However there was this Difference, that the Inhabitants of one of those Holes seem'd to be more Knowing and Industrious than their Neighbours. The Ants of that Nest were disposed in a better Order; their Corn was finer; they had a greater Plenty of Provisions; their Nest was furnished with more Inhabitants, and they were bigger and stronger: It was the Principal and the Capital Nest. Nay, I observed that those Ants were distinguish'd from the rest, and had some Pre-eminence over them.

Tho the Box full of Earth, where the Ants had made their Settlement, was generally free from Rain; yet it rained sometimes upon it, when a certain Wind blew. It was a great Inconvenience for those Insects: Ants are afraid of Water; and when they go a great way in quest of Provisions, and are surprised by the Rain, they shelter themselves under some Tile, or something else, and don't come out till the Rain is over. The Ants of the Principal Nest found out a wonderful Expedient to keep out the Rain: There was a small Piece of a flat Slate, which they laid over the Hole of their Nest, in the Day-time, when they foresaw it would rain, and almost every Night. Above Fifty of those little Animals, especially the strongest, surrounded that Piece of Slate and drew it equally in a wonderful Order: They removed it in the Morning; and nothing could be more Curious than to see those little Animals about such a Work. They had made the Ground uneven about their Nest, insomuch that the Slate did not lie flat upon it, and left a free Passage underneath. The Ants of the Two other Nests did not so well succeed in keeping out the Rain: They laid over their Holes several Pieces of old and dry Plaster one upon the other; but they were still troubled with the Rain, and the next Day they took a world of Pains to repair the Damage. Hence it is, that those Insects are so frequently to be found under Tiles, where they settle themselves to avoid the Rain. Their Nests are at all times covered with those Tiles, without any Incumbrance, and they lay out their Corn and their dry Earth in the Sun about the Tiles, as one may see every Day. I took care to cover the Two Ants-Nests, that were troubled with the Rain: As for the Capital Nest, there was no need of exerting my Charity towards it.

M. de la Loubere says in his Relation of *Siam*, that in a certain Part of that Kingdom, which lies open to great Inundations, all the Ants make their Settlements upon Trees: No Ants-Nests are to be seen any where else. I need not insert here what that Author says about those Insects: You may see his Relation.

Here follows a Curious Experiment, which I made upon the same Ground, where I had Three Ants-Nests. I undertook to make a Fourth, and went about it in the

following manner. In a Corner of a Kind of a Terrace, at a considerable Distance from the Box, I found a Hole swarming with Ants much larger than all those I had already seen; but they were not so well provided with Corn, nor under so good a Government. I made a Hole in the Box like that of an Ants-Nest; and laid, as it were, the Foundations of a new City. Afterwards I got as many Ants as I could out of the Nest in the Terrace, and put them into a Bottle, to give them a new Habitation in my Box; and because I was afraid, they would return to the Terrace, I destroyed their old Nest, pouring boiling Water into the Hole, to kill those Ants that remained in it. In the next place, I fill'd the new Hole with the Ants that were in the Bottle; but none of them would stay in it: They went away in less than Two Hours; which made me believe, that it was impossible to make a Fourth Settlement in my Box.

Two or Three Days after, going accidentally over the Terrace, I was very much surpris'd to see the Ants-Nest, which I had destroyed, very artfully repaired. I resolv'd then to destroy it entirely, and to settle those Ants in my Box. To succeed in my Design, I put some Gunpowder and Brimstone into their Hole, and sprung a Mine, whereby the whole Nest was overthrow'n; and then I carried as many Ants as I could get into the Place, which I design'd for them. It happen'd to be a very rainy Day, and it rained all Night; and therefore they remained in the new Hole all that time. In the Morning, when the Rain was over, most of them went away to repair their old Habitation; but finding it impracticable by Reason of the Smell of Powder and Brimstone, which kills them, they came back again, and settled in the Place I had appointed for them. They quickly grew acquainted with their Neighbours, and received from them all manner of Assistance out of their Hole. As for the inside of their Nest, none but themselves were concern'd in it, according to the inviolable Laws establish'd among those Animals.

An Ant never goes into another Nest but her own; and if she would venture to do it, she would be turn'd out, and severely punish'd. I have often taken an Ant out of one Nest, to put her into another; but she quickly came out, being warmly pursu'd by two or three other Ants. I tried the same Experiment several times with the same Ant; but at last the other Ants grew impatient, and tore her to pieces. I have often frighted some Ants with my Fingers, and pursu'd them as far as another Hole, stopping all the Passages to prevent their going to their own Nest. It was very natural for them to fly into the next Hole: Many a Man would not be so cautious, and would throw himself out of the Windows, or into a Well, if he was pursu'd by some Assassins. But the Ants I am speaking of, avoided going into another Hole than their own, and rather tried all other ways of making their Escape: They never fled into another Nest, but at the last Extremity; and sometimes rather chose to be taken, as I have often experienc'd. 'Tis therefore an inviolable Custom among those Insects, not to go into any other Hole but their own: They don't exercise Hospitality; but they are very ready to help one another out of their Holes. They put down their Loads at the Entrance of a neighbouring Nest; and those that live in it carry them in.

They keep up a sort of Trade among themselves; and 'tis not true that those Insects are not for lending: I know the contrary: They lend their Corn; they make Exchanges; they are always ready to serve one another; and I can assure you, that more Time and Patience would have enabled me to observe a Thousand Things more Curious and Wonderful than what I have mentioned. For Instance, how they lend, and recover their Loans; whether it be in the same Quantity, or with Usury; whether they pay the Strangers that work for them, &c. I don't think it impossible to examine all those Things; and it would be a great Curiosity to know by what Maxims they govern themselves: Perhaps such a Knowledge might be of some Use to us.

They are never attack'd by any Enemies in a Body, as it is reported of Bees: Their only Fear proceeds from Birds; which sometimes eat their Corn when they lay it out in the Sun; but they keep it under Ground, when they are afraid of Thieves. 'Tis said, that some Birds eat them; but I never saw any Instance of it. They are

also vexed by small Worms; but they turn them out, and kill them. I observ'd, that they punish'd those Ants, which probably had been wanting to their Duty: Nay, sometimes they kill'd them; which they did in the following manner. Three or four Ants fell upon one, and pull'd her several ways, till she was torn in pieces. Generally speaking they live very quietly; from whence I infer that they have a very severe Discipline among themselves, to keep so good an Order; or that they are great Lovers of Peace, if they have no Occasion for any Discipline.

Was there ever a greater Union in any Commonwealth? Every thing is common among them; which is not to be seen any where else. Bees, of which we are told so many wonderful things, have each of them a Hole in their Hives; Their Honey is their own; Every Bee minds her own Concerns. The same may be said of all other Animals: They frequently fight, to deprive one another of their Portion. It is not so with Ants: They have nothing of their own: A Grain of Corn which an Ant carries home, is deposited in a common Stock: It is not design'd for her own Use, but for the whole Community: There is no Distinction between a private and a common Interest: An Ant never works for her self, but for the Society.

Whatever Misfortune happens to them, their Care and Industry find out a Remedy for it: Nothing discourages them. If you destroy their Nests, they will be repaired in Two Days. Any body may easily see how difficult it is to drive them out of their Habitations, without destroying the Inhabitants; for, as long as there are any left, they will maintain their Ground.

I had almost forgot to tell you, Sir, that *Mercury* has hitherto prov'd a mortal Poison for them; and that it is the most effectual way of destroying those Insects. I can do something for them in this Case: Perhaps you will hear in a little time that I have reconcil'd them with *Mercury*.

BRUSSELS.

A CANON of the Church of Tournay designs to publish a New Edition of the Works of *Boetius* *Epo*, Doctor of Civil Law, who was sent to *Douay* by *Philip II.* to found an University in that City. The Works of that Author are grown very scarce. They were publish'd at *Douay* at several Times, viz. *Juliani Archiepiscopi Prognosticon, sive de futuro seculo*, Libri III. 1564. 8vo. *Antiquitatum Ecclesiasticarum Syntagma* IX. 1578. 8vo. *Heroicarum & Ecclesiasticarum Questionum Libri VI.* De Jure Sacro, vel Principiorum Juris Pontificii, Libri III. 1588. 8vo. 3 Vol. The New Edition will be enlarged with several Pieces of that Author, never yet publish'd.

PARIS.

THE Author of the *History of the V. Proposition*, has lately publish'd Three Letters concerning the Heresies of the XVIIth. Century, that is, against *Jansenism*. *Lettres d'un Docteur de Sorbonne à un homme de qualité, touchant les heresies du dix-septième siècle.* Paris, 1711. in 120.

Those Three Letters are attended with an *Abridgment of St. Austin's Opinions relating to the System of Jansenius, and the Matter of the Five Propositions.*

FATHER *de Arana*, a Carmelite, has publish'd a Book at *Pampeluna*, in favour of *Philip V.* The Title of that Book is a kind of Curiosity: It runs thus word for word. "The Lord *Philip V.* is true King of Spain, of God's own making. The Tower of the Second *David* persecuted and victorious, fortified with Three Bulwarks, viz. Justice, Religion, and Politicks, to which a thousand Shields are fasten'd to defend his Crown: De-

II.

DE DIGNITATE & Utilitate Juris ac Historiarum & utriusque Disciplinæ amica conjunctione. Oratio Inauguralis, quam dixit A.D. XIV. Kalend. April. MDCCXI. JOANNES BARBEYRACUS Juris & Historiarum in Academia Lausannensi Professor Ordinarius. Lausannæ Helvetiorum. Apud Fridericum Gentil & Theophilum Crofat. MDCCXI.

That is, AN ORATION concerning the Excellence and Usefulness of Civil Law and History, and the great Affinity between those two Sciences, pronounced the 19th of March 1711. by JOHN BARBEYRAC, upon his being admitted Professor of Civil Law and History in the Academy of Lausanne. Lausanne. 1711. in 4to. Pagg. 26.

I Only mention this Piece, to inform the Readers, that they will find in it many judicious Observations concerning the Usefulness of Civil Law and History. The Author shews with great Perspicuity, that Men of all Professions ought to have some Knowledge of those Two Sciences. Those, who are not sensible of the great Use of Civil Law, will be convinced of the contrary by reading this excellent Oration. I have read it with great Satisfaction; and it appears to me one of the most solid Discourses, that can be made upon such an Occasion. I am informed that it will be Reprinted in Holland.

"dicated and consecrated to the King our Lord, whom God preserve for the Glory of Spain, and the good of Christendom, by Father Hyacinthius de Arana, a Native of the most Faithful City of *Sanguessa*, Doctor of Divinity, Synodal Examiner of the Archbishoprick of *Toledo*, Chaplain to his Majesty, &c.

El Señor *Phelipe V.* es el Rey de las Españas verdadero, dado por la mano de Dios. Torre incontrastable del segundo David perseguido, y victorioso, guarnecida de tres Propugnáculos, Justicia, Religión, y Política; de que penden mil Estudios que defienden su Corona: Que dedica, y consagra al Rey nuestro Señor, que Dios guarde para gloria de España, y aumento de la Christiandad, Fr. Jacinto de Arana, natural de la fidelísima Ciudad de *Sanguessa*, M. en Sagrada Theología, Examinador Synodal del Arcoobispado de *Toledo*, Predicador de Su Mag. Ex-Procurador y Comissario general del Orden de Nuestra Señora del Carmen, y Provincial Titular. *Pampeluna*, 1711. in 4to. pagg. 584.

The Author compares his Work to a Tower or Fortress with three Bulwarks. Fifteen Shields are fasten'd to the first Bulwark; Eight to the second; and Four to the third. To get into that Fortress, one must go thro' a Portico, where, says the Author, one may be inform'd that the Devil, in the Quality of Prince of Discord, inspires the Malecontents with a Desire of changing their King; and has entrusted the Hereticks with the Execution of such an Enterprize.

Father *de Arana* cannot be reconciled with the Names of the Generals of the Allies: He thinks they are very hard Names, and seems to believe that they have been forged in Hell. *Hasta los nombres de los Xefes de esta liga suenan a impuestos en la pila del infierno, puzo Marlborough, Stanop, Tromp, Trufaldin, Mizeldorf, Alcampus, nombres parientes de Diablos campanudos.*